

1. an ^{56}Fe nucleus has more binding energy per nucleon than any other nucleus in creation ✓
2. Pions are small particles that switches between nucleons. They are important in nuclear chemistry because the force they create when swapping from nucleons holds the nucleus together. ✓
3. The first atom is more stable ✓
4. The electron collided with a positron ✓
5. only ^{12}C , ^{14}N , and ^{64}Zn are stable nuclei ✓
6. ^{40}Ar is a light isotope which means it will cause a nuclear fusion ✓

$$\frac{21}{21}$$

100%

$$7. \quad 0.0993 \text{ amu} \left(\frac{1.6605 \times 10^{-27} \text{ kg}}{1 \text{ amu}} \right) = 1.65 \times 10^{-28} \text{ kg}$$

$$\begin{aligned} &6(1.0087) + 6(1.0073) \\ &= 12.0960 \text{ amu} \\ &- 11.9967 \\ &= 0.0993 \text{ amu} \end{aligned}$$

$$E = (1.65 \times 10^{-28}) (3.00 \times 10^8)^2 = 1.49 \times 10^{-11} \text{ J}$$

$$\frac{1.49 \times 10^{-11}}{12} = 1.24 \times 10^{-12} \text{ J/nucleon}$$

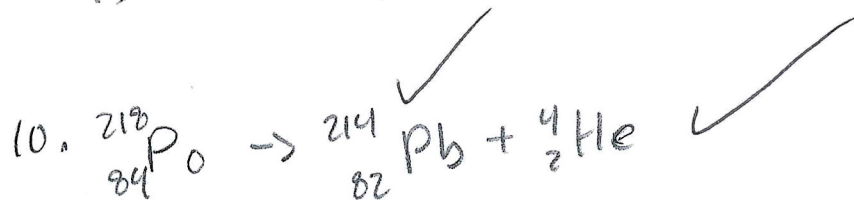
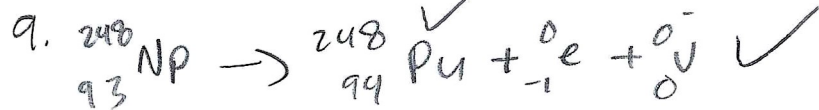
$$8. \quad 5.16 \times 10^{-12} = m (3.00 \times 10^8)^2 \rightarrow \frac{5.73 \times 10^{-29} \text{ kg}}{1} \left(\frac{1 \text{ amu}}{1.6605 \times 10^{-27} \text{ kg}} \right)$$

$$\frac{5.16 \times 10^{-12}}{9 \times 10^{16}} = m = 0.0345 \text{ amu}$$

$$m = 5.73 \times 10^{-29} \text{ kg} \quad 3(1.0073) + 3(1.0087)$$

$$\begin{aligned} &= 6.0480 \text{ amu} \\ &- 0.0345 \text{ amu} \end{aligned}$$

$$= 6.0135 \text{ amu}$$



$$11. N = 44.0g \left(\frac{1}{2}\right)^{\frac{28.6}{14.3}}$$

$$N = 44.0g \left(\frac{1}{2}\right)^2$$

$$N = \frac{44.0}{4} = 11.0g \quad \checkmark$$

12.

$$K \cdot 10.76 = \frac{0.693}{K} \quad \checkmark$$

$$\frac{10.76}{10.76} K = \frac{0.693}{10.76}$$

$$K = 0.0644 \text{ half years} \quad \checkmark$$

$$N = (15.0g) \left(e^{-(0.0644)(20.0)} \right)$$

$$= 15.0g (0.2758) = 4.1g \quad \checkmark$$